

### REMARKS

This application contains claims 1-4, 6-17, 21-24, 26-33 and newly added claims 34-39. Claims 5, 18, 19 and 25 have been canceled herein. Withdrawn claim 20 was previously canceled without prejudice to filing a divisional application to the invention represented by claim 20.

#### Objection to Drawings Under 37 C.F.R. 1.84(p) (4)

A replacement drawing sheet 1/11 is submitted herewith wherein the words AND/OR have been removed. In the replacement drawing sheet, the spectrometer is identified by reference numeral 12 and the detector by reference numeral 14. Thus, it is submitted that there is now no confusion. It is respectfully requested that the Examiner withdraw the objection to the drawings.

#### Rejections Based on Prior Art

Claims 1-4, 7, 11-17, 21-24, 6 and 31-33 were rejected as obvious over the newly cited patent to Rodrigues et al. Claims 5, 6, 8-10, 18, 19, 25 and 27-30 were rejected as obvious over Rodrigues et al. in view of the newly cited patent to Kennedy et al. These rejections are respectfully traversed.

Claim 1, which now includes the general recitations of canceled claim 5, and includes the further recitation:

evaluating a first plurality of spectra of light reflected from a first group of particles by varying distance between

a first light conductor for conducting light to said particles and a second light conductor for conducting light from said particles, and analyzing spectra of light received from said first group of particles at a plurality of distances between said first light conductor and said second light conductor;

The same type of analysis is used for a second group of particles.

Amended claim 1 is clearly distinguishable from Rodrigues et al. in at least two significant ways. First, Rodrigues et al. makes a particular effort to specify transmittance measurements, i.e., light going through the sample. For example, (col. 4, line 67 to col. 5, line 7) emphasize a way to circumvent implied problems with light scattering (and avoid making reflectance measurements) by either diluting the sample or reducing the pathlength. In sharp contrast to Rodrigues et al., Applicants' invention, as set forth in claim 1 is actually reliant on particulate matter to reflect light and provide the optical signal.

The second distinguishable feature of claim 1 is the use of *multiple spectra* taken at different distances between the light conductors labeled "movie" in Applicants' specification (at, for example, page 14, lines 8-15, and page 22). A single movie is shown in Fig. 5, and an ensemble of movies, corresponding to the evolution of a sample as it is being processed, is seen in Figs. 6 and 7. This three-dimensional surface, created from scattered light, is demonstrably different from either Rodrigues et

al. or Kennedy et al. Nor is it obvious over them, whether taken alone or in combination.

Kennedy et al. adds nothing pertinent to the teachings of Rodrigues et al. In fact, Kennedy (col. 6, lines 27-29) actually teaches away from amended claim 1 by expressly requiring measurement of scattered light at zero degrees. Such requirement is applicable to fiber spacing of essentially zero distance, and is exactly the opposite of varying the distance, as in claim 1.

In view of the above, it is respectfully submitted that the rejection of claim 1 is simply not tenable, as claim 1 is clearly directed to patentable subject matter. Allowance of claim 1 is respectfully requested.

With respect to claim 6, which depends from claim 1, it is pointed out that variation of the distance between the light source and the receiver mitigates spurious reflections that are inherent in standard reflectance techniques. The zero-angle probing method of Kennedy et al. redirects a portion of the illumination light back to the detector without ever entering the sample. This occurs because light is naturally reflected from surfaces, such as that provided by a glass optical cell. Thus, methods such as that of Kennedy et al. are plagued by the presence of additional spurious signals, a flaw eliminated by practicing what is taught in Claim 6. It is thus submitted that claim 6 is also directed to patentable subject matter.

The rejections of claims 8, 9 and 10 are also not tenable. Claim 8 recites moving the first light conductor and the

second light conductor along a column containing the liquid. Claim 9 recites determining at least one of a rate of motion of an interface in the liquid, and characteristics of particles in a vicinity of said interface. Claim 10 recites determining characteristics of particles on opposite sides of the interface.

The rejections of claims 8, 9 and 10 are not supported by fact or law. First, these claims ultimately depend from claim 1. Second, there is no suggestion in Rodrigues et al. or Kennedy et al. of moving the first light conductor and the second light conductor along a column containing the liquid, as recited in claim 8. There is no teaching or suggestion in the references of determining at least one of a rate of motion of an interface in the liquid, and characteristics of particles in a vicinity of said interface, as recited in claim 9. In fact, the rejection is not tenable because there is no mention of settling of particles, or even of an interface in the references, and the rejection makes no mention of such. Thus, there can be no mention of determining characteristics of particles on opposite sides of the interface, and again the rejection of claim 10 makes no mention of such. In view of these facts, it is submitted that the Examiner must withdraw the rejection of claims 8, 9 and 10.

Claim 12 recites that the first group of particles and the second group of particles are successive groups of particles in a batch of particles undergoing a process of mixing, and the evaluating of the particles is performed at a series of different times, to obtain an indication of homogeneity of a mixture containing the particles.

Rodrigues et al. examines the overall trend in the data, seeking either a definite value at the moment of measurement or anticipating a future goal, or target size. Applicants' invention, as set forth in claim 12 examines the intermediate state of the data, observing more than an average particle size. Instead, the Applicants recognized that typical samples can have a very wide distribution of particle sizes, each present at different concentrations. Claims 12 is based on Applicants' recognition that the fluctuations in measured signal may be correlated with the presence of large fragments, many of which may be large enough to swing the average signal. As the mean signal moves closer to the overall average trendline for the process, the contribution of large fragments diminishes. Overall, this process can be compared to turning a discrete inhomogeneous "soup" into a more uniform puree. At early times in a process, more or fewer individual chunks of material may be measured; eventually, in a grinding situation, the chunks disappear. Along with their disappearance the smoothness of the signal increases. In that sense, the method of claim 12 quantifies the homogeneity of a mixture.

There is not a word in Rodrigues et al. about obtaining an indication of homogeneity of a mixture containing the particles. It is thus submitted that claim 12 is directed to patentable subject matter.

Independent apparatus claim 21 has been amended in a manner analogous to that of independent method claim 1, including recitations from canceled claim 25. For the detailed reasons set forth above with respect to claim 1. It is

submitted that claim 21 is also directed to patentable subject matter.

Apparatus claims 28, 29 and 30 are analogous to method claims 8, 9 and 10 discussed above. For the reasons set forth in detail above, it is respectfully submitted that claims 28, 29 and 30 are directed to patentable subject matter.

Newly added apparatus claim 34 (which depends from claim 21) and newly added method claim 36 (which depends from claim 1), recite that the distance is varied by changing separation between the first light conductor and the second light conductor, in a direction perpendicular to a path of light along said first light conductor and said second light conductor. Claims 34 and 36 serve to further distinguish Applicants' invention by more specifically defining the direction of motion. As also noted with respect to claim 6, several problems associated with reflected light in prior art zero angle techniques are avoided. Thus, claims 34 and 36 are directed to patentable subject matter.

Newly added claim 35 is similar to claim 34 but also recites that the first light conductor is disposed generally parallel to the second light conductor. For essentially the reasons set forth above with respect to claim 34, it is submitted that claim 35 is also patentable.

Newly added method claim 37, which depends from claim 1, recites that the first plurality of spectra and the second plurality of spectra each generate a three dimensional

surface which may be compared. This "movie" was referred to generally in the discussion of claim 1, above. The prior art does not teach or suggest this approach. Thus, it is submitted that claim 37 is directed to patentable subject matter.

Newly added claim 38 is directed to a method for determining position of an interface in a liquid in accordance with particles therein. As noted above in the discussion with respect to claims 9 and 10, the references do not even hint at such a method. It is submitted that claim 38 is directed to patentable subject matter.

Newly added claim 39 is directed to a method for evaluating one or more materials in accordance with size of particles therein. When a first group of particles and a second group of particles are successive groups of particles in a batch of particles undergoing a process of mixing, and the evaluating of the particles is performed at different times, an indication of homogeneity of a mixture containing said particles is obtained. As noted above in the detailed discussion of claim 12, there is absolutely no teaching or suggestion in the prior art of this type of homogeneity detection. It is thus submitted that claim 39 is also directed to patentable subject matter.


The remaining claims depend from independent method claim 1, or independent method claim 21. These claim have further recitations, which in combination with the recitations of the claim from which they depend, are not shown or suggested in the art of record. For the reasons set forth above with respect to claim 1 and claim 21, it is

respectfully submitted that the remaining claims are also directed to patentable subject matter.

In view of the above, it is respectfully submitted that this application is in a condition for allowance. A Notice of Allowance is respectfully requested.

Applicant requests a two-month extension of time for the filing of this paper. A check in the amount of \$350 is enclosed (\$225 for a two month extension of time, \$100 for one additional independent claim over 3 independent claims, and \$25 for one additional total claim over the 33 total claims originally filed). If any additional fee is required, please charge deposit account no. 502244. A duplicate of this page is attached.

Respectfully submitted,

  
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